

# Cognitive Disparities: What Role in Creating Health Disparities?

Linda S. Gottfredson, PhD

*Presenter in Book Event, “The Health Disparities Myth:  
Diagnosing the Treatment Gap”*

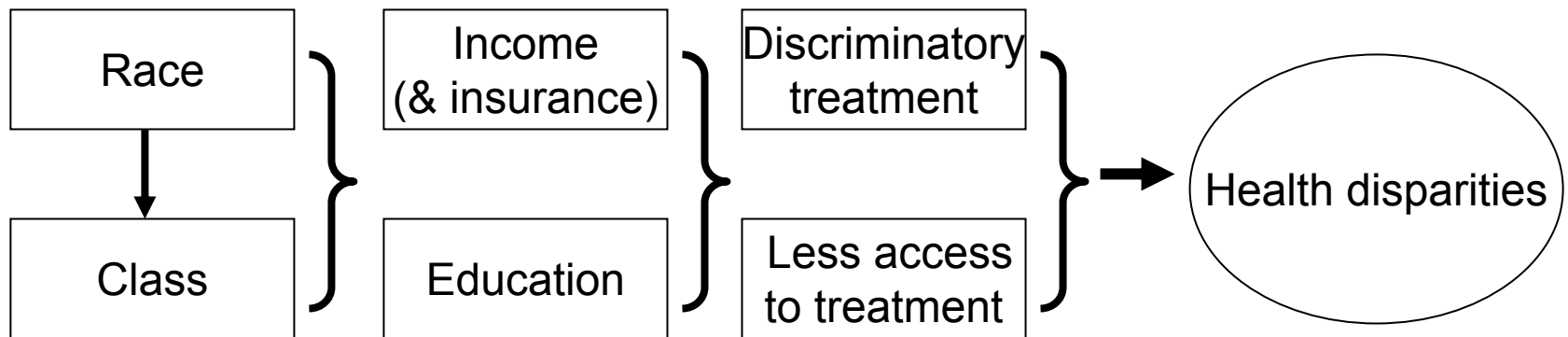
*American Enterprise Institute, Washington DC*

*February 22, 2006*

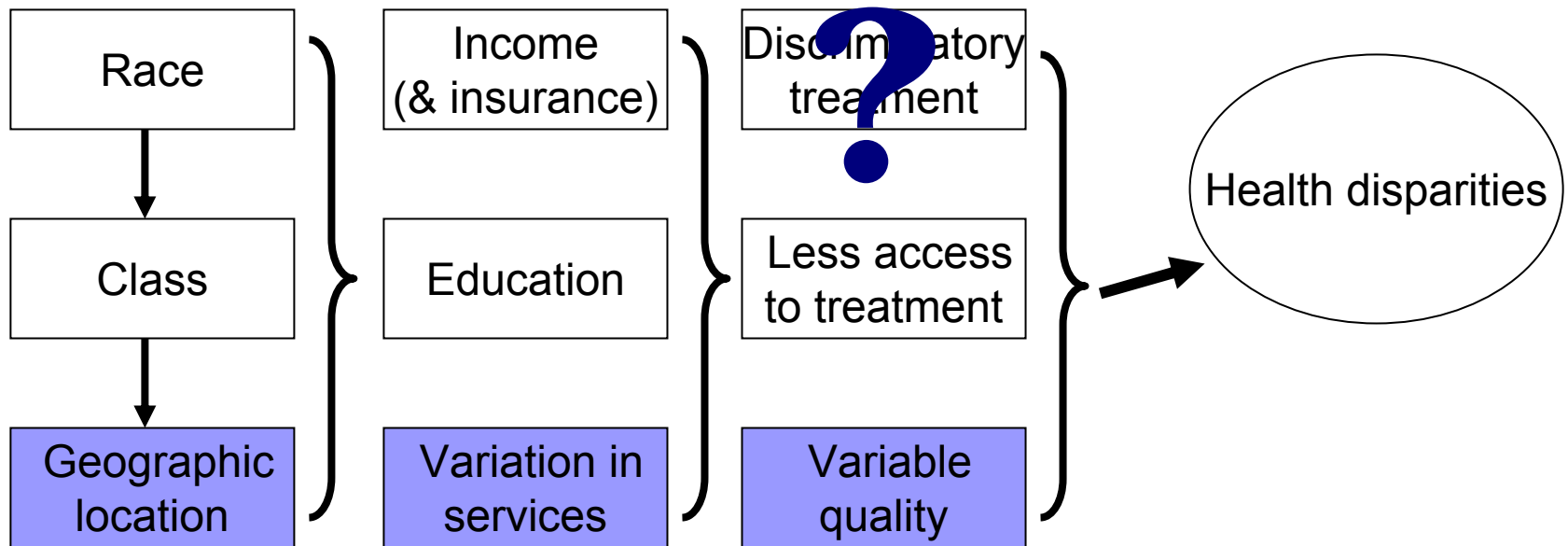
# Today, I Will—

- Agree—more plausible explanations for health disparities than treatment bias
- Amplify—patient-side factors include general reasoning ability ( $g$  factor)
- Describe—how this information can improve health & save lives

# Standard Disparities Model



# Klick & Satel's First "3<sup>rd</sup> Variable"



**Patient attributes also matter**

Cannot assume that differences = discrimination.  
There is a plausible alternative explanation.

# Patients' Central Role

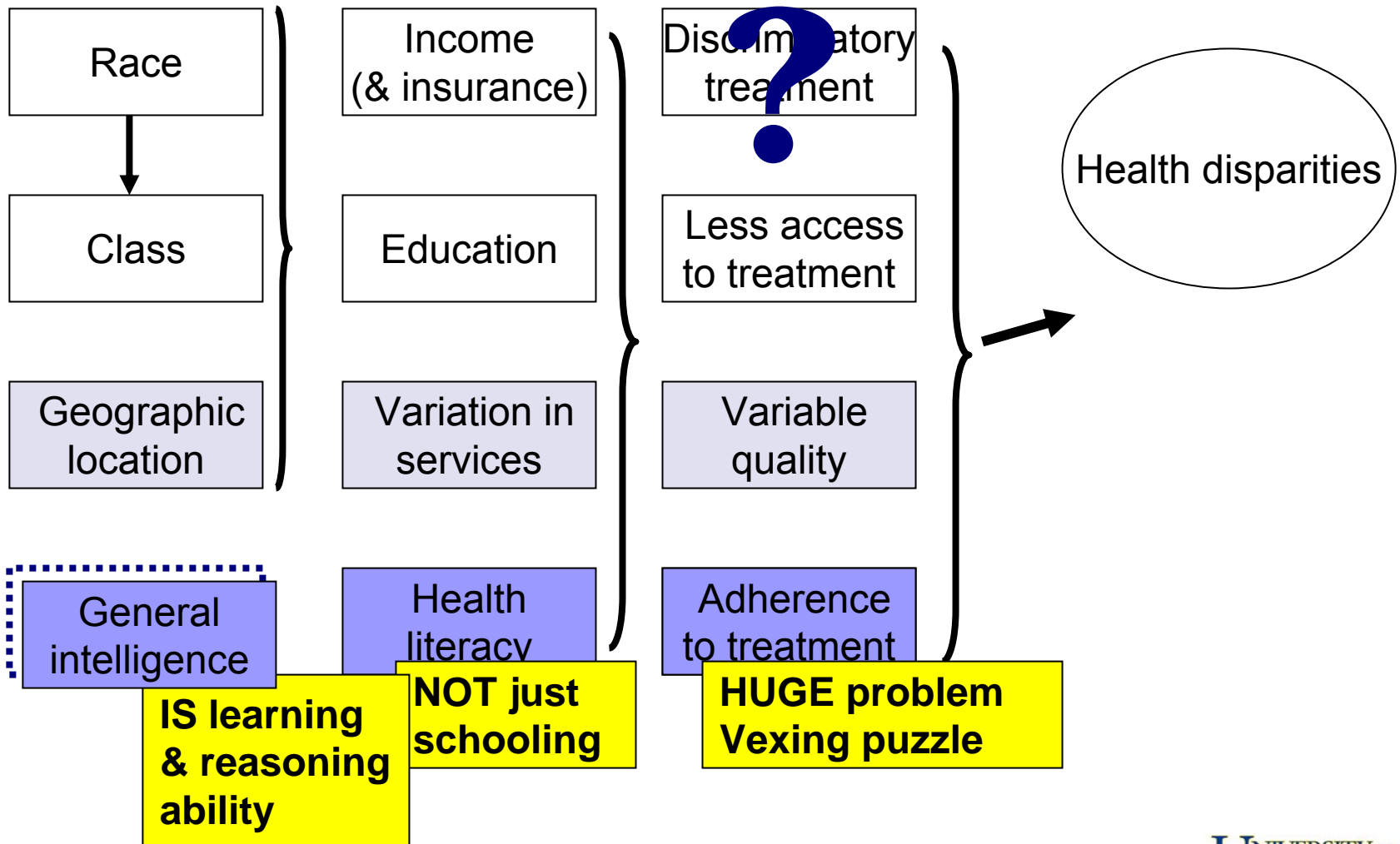
## We are our own “primary health care providers”

- Lifetime self-care is key to good health—prevent disease & injury, manage daily treatment
- Is a complex job requiring much independent judgment
- People differ greatly in how effectively they use preventive & curative resources available to them

## Therefore, identical treatment does not produce same results

- Equalizing access and quality of health care does not—cannot—equalize health
  - Introduction of national health care in Britain increased class disparities in health
- General rule in education too
  - Interventions that improve the average also increase the variance

# Faulty Self-Care



# Practical Importance of Literacy

- Patients examine the actual vials or documents

% of urban hospital outpatients <b><i>not</i></b> knowing	Health literacy level		
	V-low	Low	OK
<div style="background-color: #e0e0ff; padding: 5px; border: 1px solid black; display: inline-block;">                     Many professionals have no idea how difficult these “simple” things are for others                 </div>			
How to take meds 4 times per day	24	9	5
When next appointment is scheduled	40	13	5
How many pills of a prescription to take	70	34	13
What an informed consent form is saying	95	72	22

# Insulin-Dependent Diabetics

And these are their <i>simplest</i> tasks	Health literacy level		
	V-low	Low	OK
<b>Signal:</b> Thirsty/tired/weak usually means <u>blood sugar too high</u>	40	31	25
<b>Action:</b> Exercise lowers blood sugar	60	54	35
<b>Signal:</b> Suddenly sweaty/shaky/hungry usually means <u>blood sugar too low</u>	50	15	6
<b>Action:</b> Eat some form of sugar	62	46	27

But how typical are these individuals?



# National Literacy Survey

- Items simulate everyday health tasks
- Analyzed what increases item difficulty (error rates)
- Gives scores by race, education, age, income, etc

Sample item

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Pediatric Dosage Chart Drops, Syrup, & Chewables

Age	Approximate Weight Range*	Dosage			
		Drops	Syrup	Chewables 80 mg	Chewables 160 mg
† Under 3 mo	Under 13 lb	½ dropper	¼ tsp	—	—
† 3 to 9 mo	13-20 lb	1 dropper	½ tsp	—	—
† 10 to 24 mo	21-26 lb	1 ½ droppers	¾ tsp	—	—
2 to 3 yr	27-35 lb	2 droppers	1 tsp	2 tablets	—
4 to 5 yr	36-43 lb	3 droppers	1 ½ tsp	3 tablets	1 ½ tablets
6 to 8 yr	44-62 lb	—	2 tsp	4 tablets	2 tablets
9 to 10 yr	63-79 lb	—	2 ½ tsp	5 tablets	2 ½ tablets
11 yr	80-89 lb	—	3 tsp	6 tablets	3 tablets
12 yr and older	90 lb & over	—	3-4 tsp	6-8 tablets	3-4 tablets

† Consult with physician before administering to children under the age of 2 years.  
Dosage may be given every 4 hours as needed but not more than 5 times daily.

How Supplied:

Drops: Each 0.8 ml dropper contains 80 mg (1.23 grains) acetaminophen.

Syrup: Each 5 ml teaspoon contains 160 mg (2.46 grains) acetaminophen.

Chewables: Regular tablets contain 80 mg (1.23 grains) acetaminophen each. Double strength tablets contain 160 mg (2.46 grains) acetaminophen each.

\* If child is significantly under- or overweight, dosage may need to be adjusted accordingly.

The weight categories in this chart are designed to approximate effective dose ranges of 10-15 milligrams per kilogram. (Current Pediatric Diagnosis and Treatment, 8th ed. CH Kempe and HK Silver, ed. Lange Medical Publications: 1984, p. 1079) LA-1451-2-88 © 1988, Bristol-Myers U.S. Pharmaceutical and Nutritional Group • Evansville, Indiana 47721 U.S.A.

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# #1—Underline sentence saying how often to administer medication

## Pediatric Dosage Chart



### Pediatric Dosage Chart Drops, Syrup, & Chewables

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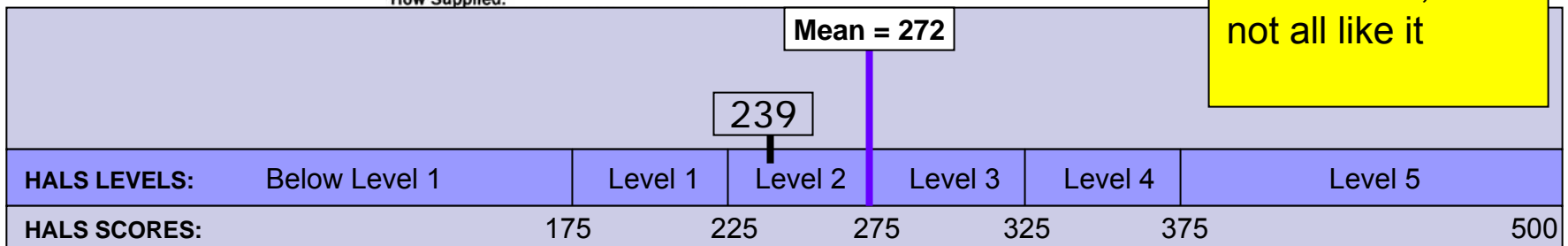
How Supplied:

- One piece of info
- Simple match
- But lots of irrelevant info

% US adults routinely functioning below this level?

**20%**

**Caution!**  
Could train them do this item, but not all like it



# #2—How much syrup for 10-year-old who weighs 50 pounds?

## Pediatric Dosage Chart

- Spot & reconcile conflicting info
- Inference from ambiguous info
- Multiple features to match

Recommend

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# #2—How much syrup for 10-year-old who weighs 50 pounds?

## Pediatric Dosage Chart

Recommend



### Pediatric Dosage Chart Drops, Syrup, & Chewables

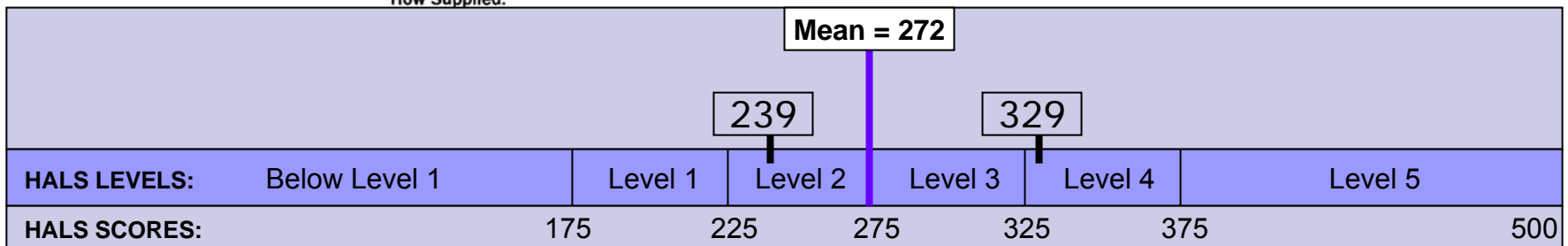
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 How Supplied:

- Spot & reconcile conflicting info
- Inference from ambiguous info
- Multiple features to match

% US adults routinely functioning below this level?

**46%**



# #3—Your child is 11 years old and weighs 85 pounds. How many 80 mg tablets can you give in 24-hr period?

- Multiple features to match
- Two-step task
- Infer proper math operation
- Select proper numbers to use
- Ignore the most obvious but incorrect number
- Calculate the result

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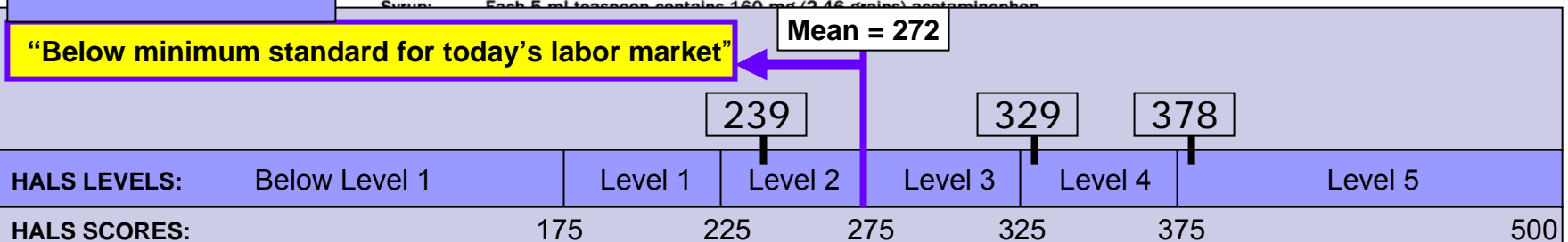
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% US adults routinely functioning below this level?  
**99%**


“Below minimum standard for today’s labor market”

Mean = 272



# % at Each Literacy Level, By Race

## HALS: Adults Aged 16+

White	<b>38</b>	3	9	26	40	21	2
Black	<b>75</b>	12	22	41	22	3	*
Hispanic	<b>72</b>	30	15	27	22	5	* 
<b>HALS LEVELS:</b>	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5	
<b>HALS SCORES:</b>		175	225	275	325	375	500

# % at Each Literacy Level, By Race

## NALS: College Degree

White	10	2	8	32	45	13
Black	37	8	29	44	16	2
Hispanic	34	9	25	37	25	4

## NALS: High School Diploma or GED

White	49	11	38	41	12	1
Black	79	32	47	19	2	*
Hispanic	71	32	39	26	4	*

General finding in all studies of cognitive skills—  
Blacks perform more like whites 3-4 grades below  
(with Hispanics not quite as far below)

HALS LEVELS:	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
HALS SCORES:	175	225	275	325	375	500



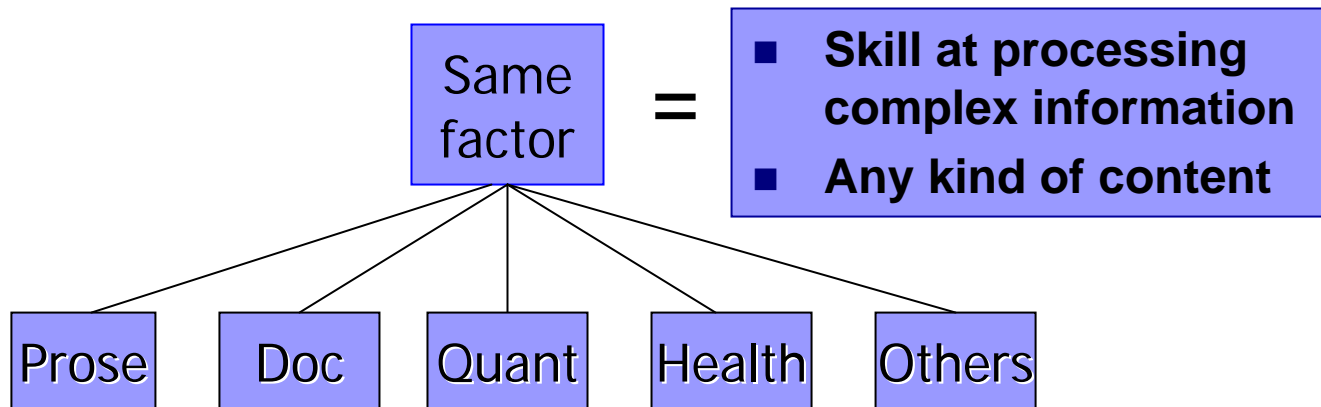
# Cognitive Hurdles in Daily Self-Care: Less Obvious Examples

- Hypertension
  - No outward symptoms
  - So treatment is a nuisance without obvious benefits
- Asthma
  - Symptoms are obvious, but benefits of the superior drug are not
    - Bronchodilators give immediate but only temporary relief
    - Inhaled steroids don't give fast relief but provide better long-term control—and reduce likelihood of emergencies
- Cognitive hurdles common to both

Reasoning, not “reading”

# Different Literacy Scales, But Same Learning-Reasoning Ability

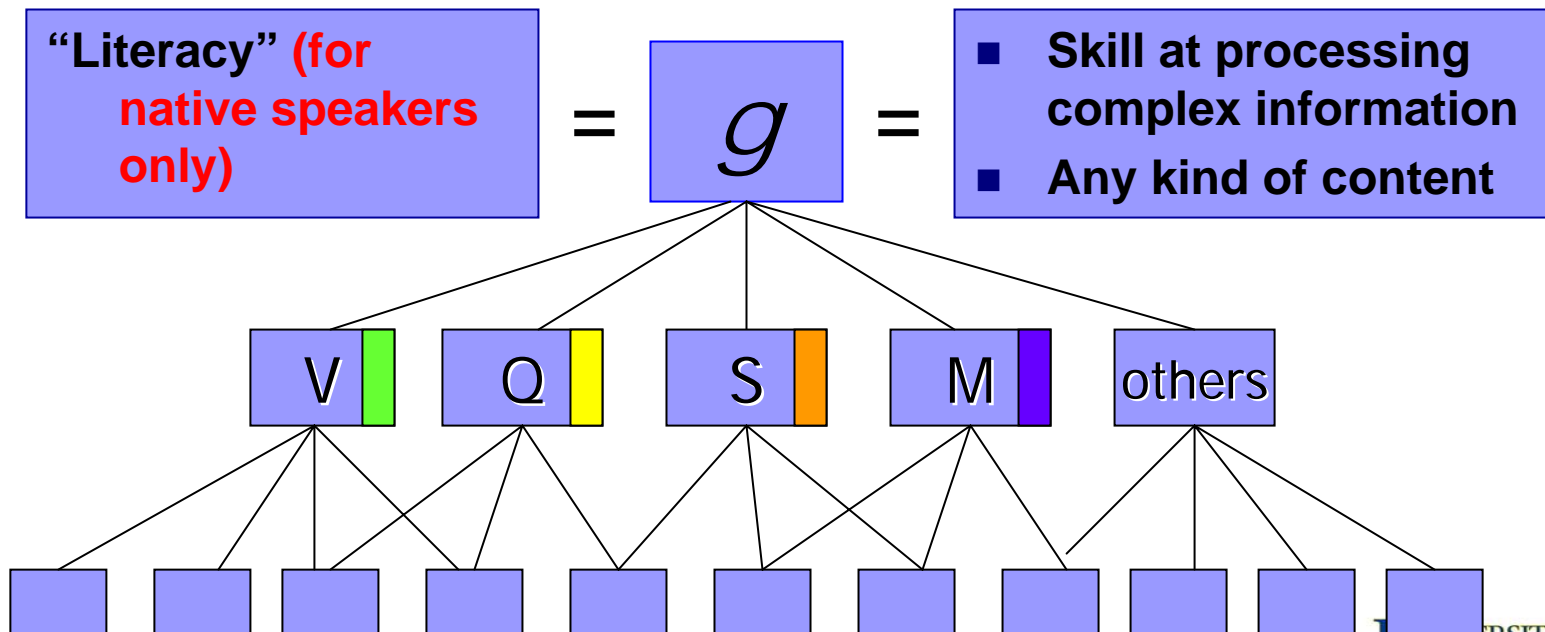
- All scales give nearly identical results
- All capture same ability to “comprehend & reason—to understand, analyze, interpret, & evaluate information & apply principles & concepts”
- Item difficulty depends on complexity—not content—of information to be processed



# Many Abilities, But One Intelligence—The $g$ Factor

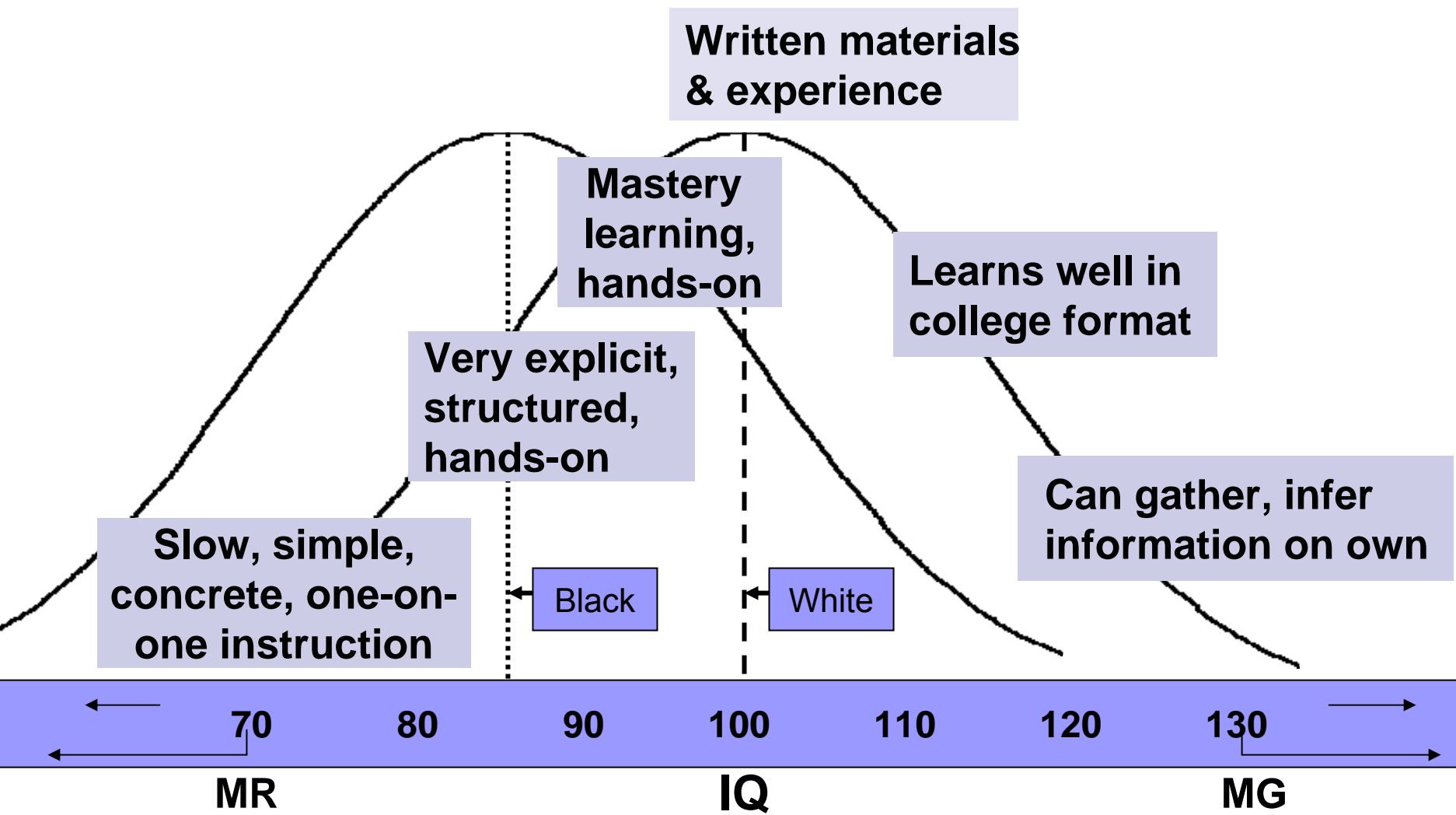
- All abilities correlated (*not identical*)
- $g$  is backbone of all others
- Captures “a general ability to learn, reason, think abstractly”

General  
↑  
Specific



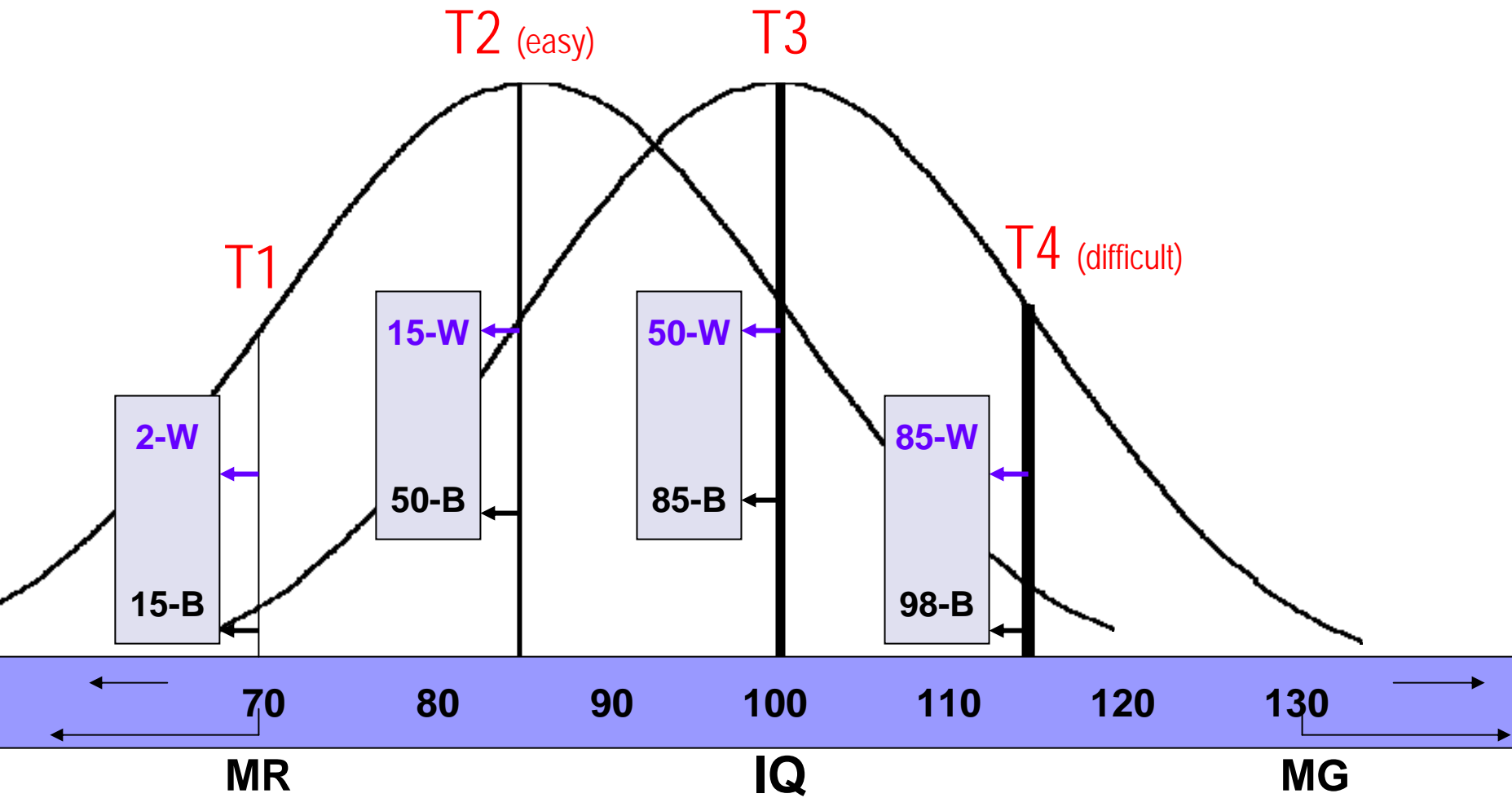
# Apt Learning Requires Apt Reasoning and Understanding

Young Adults



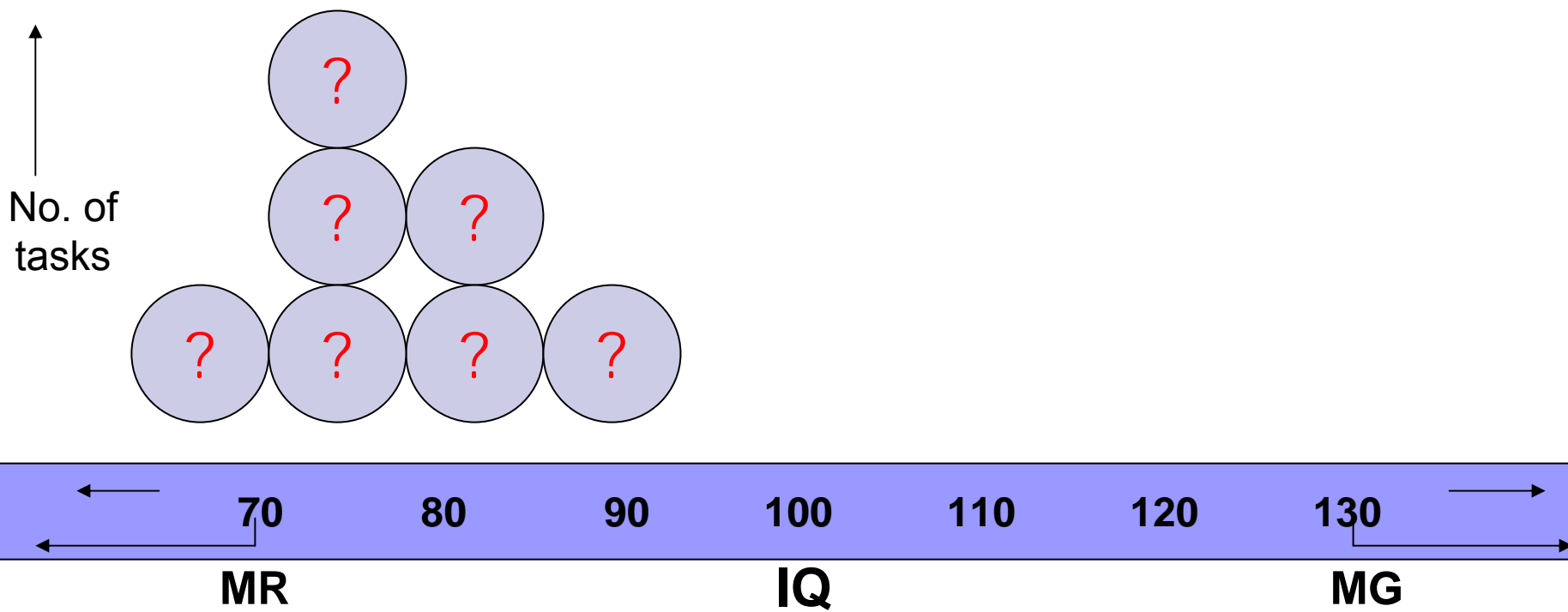
# Disparities in Risk Vary by Task Complexity Level (T)

% Whites and Blacks at high risk of non-adherence (cognitive error)



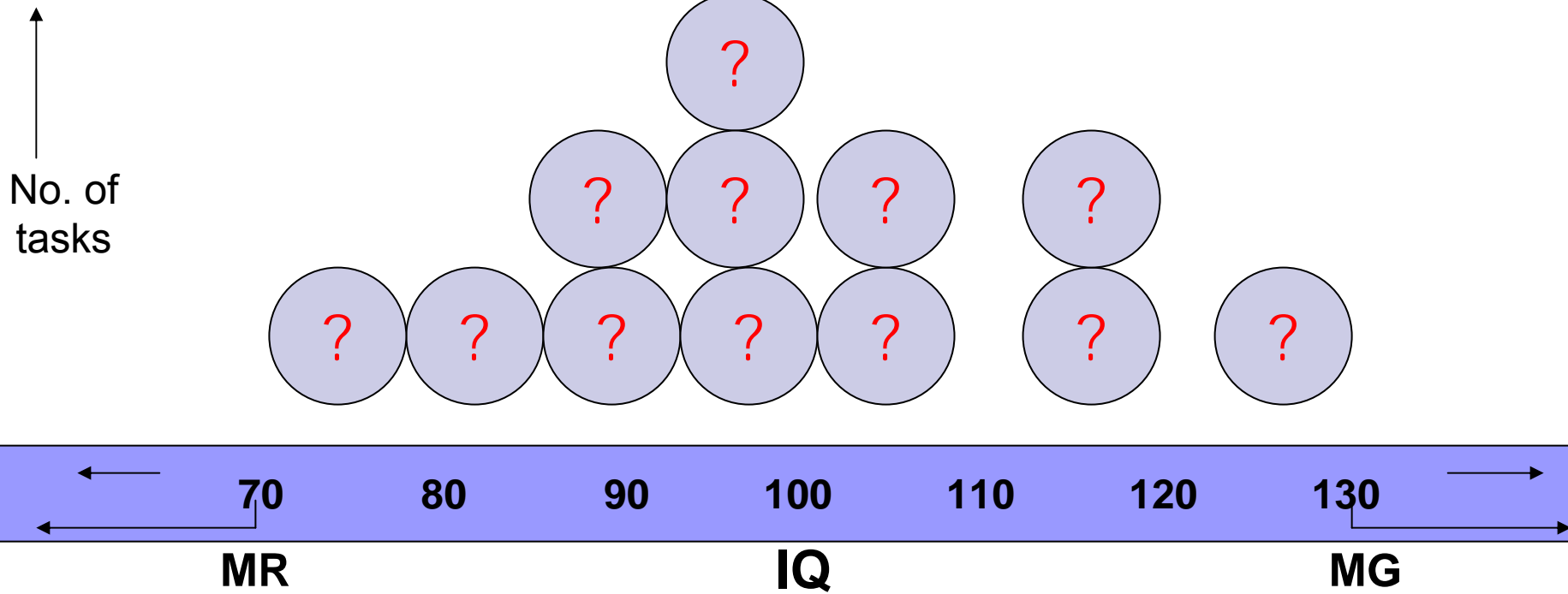
# Distribution of Cognitive Hurdles?

Easy is unlikely



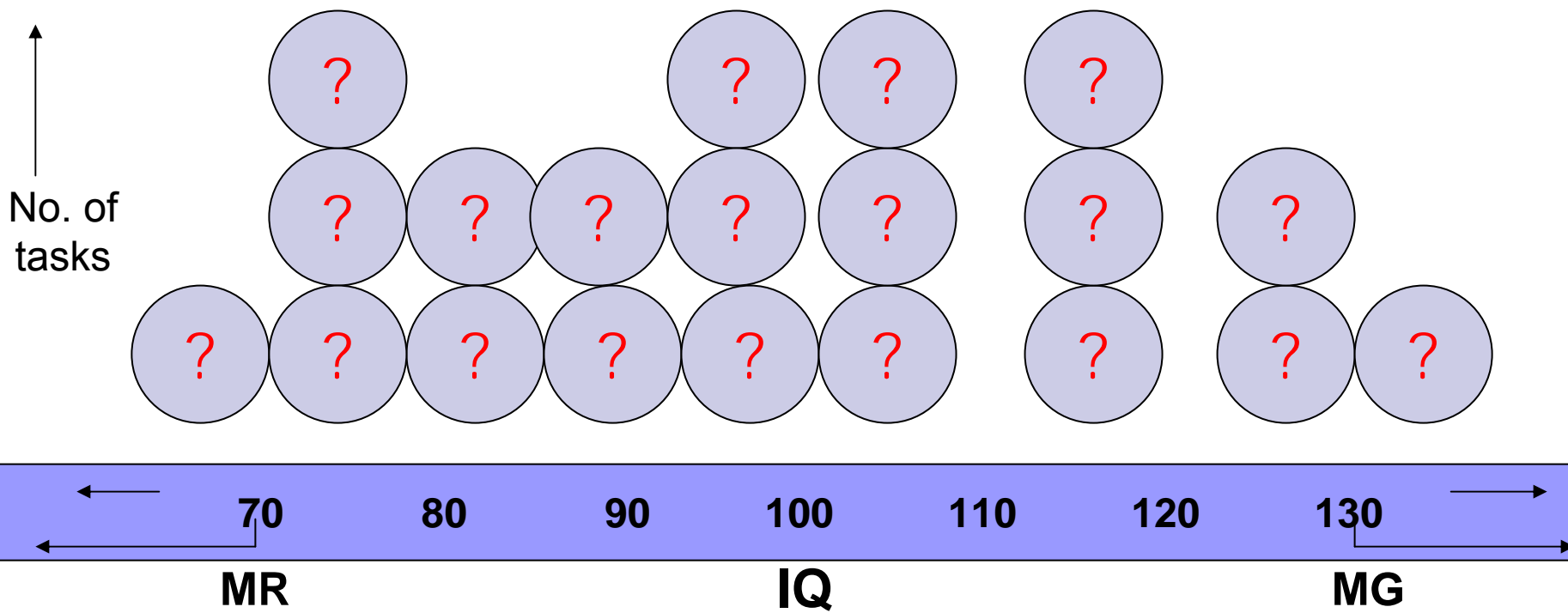
# Distribution of Cognitive Hurdles?

Broad range is more likely



# Distribution of Cognitive Hurdles?

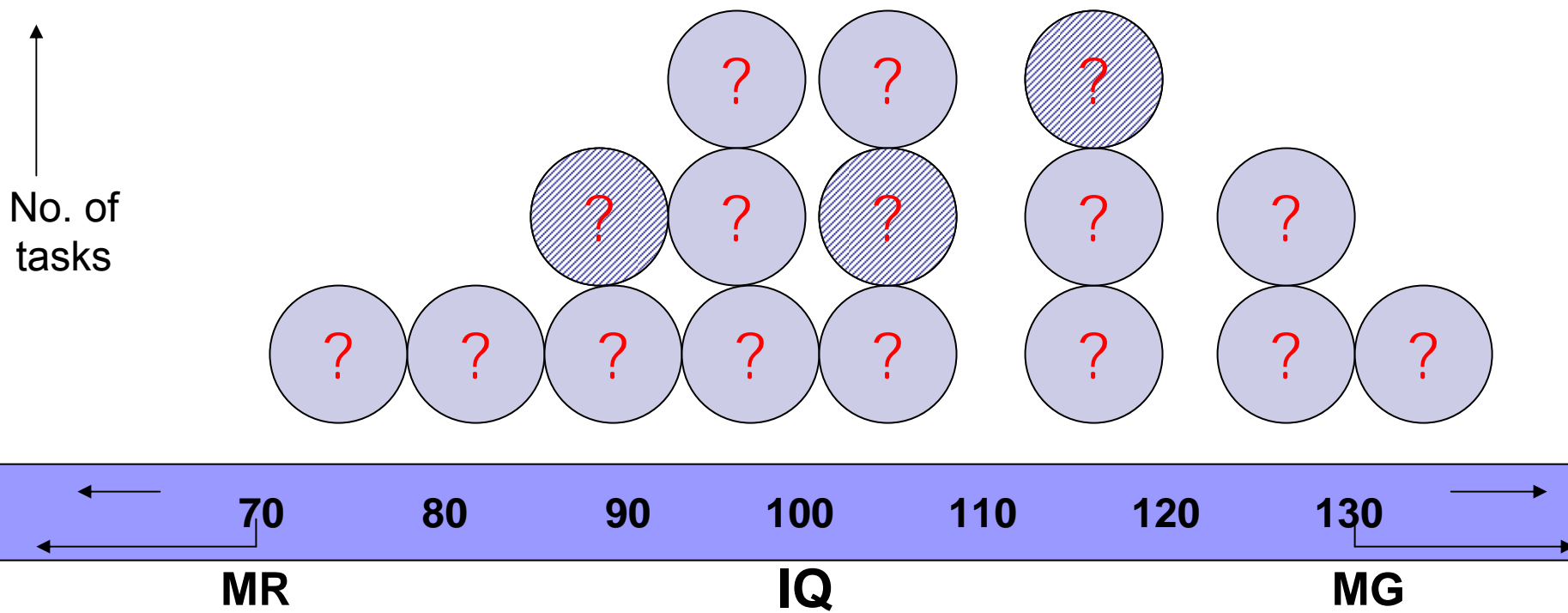
Medical advances increase complexity





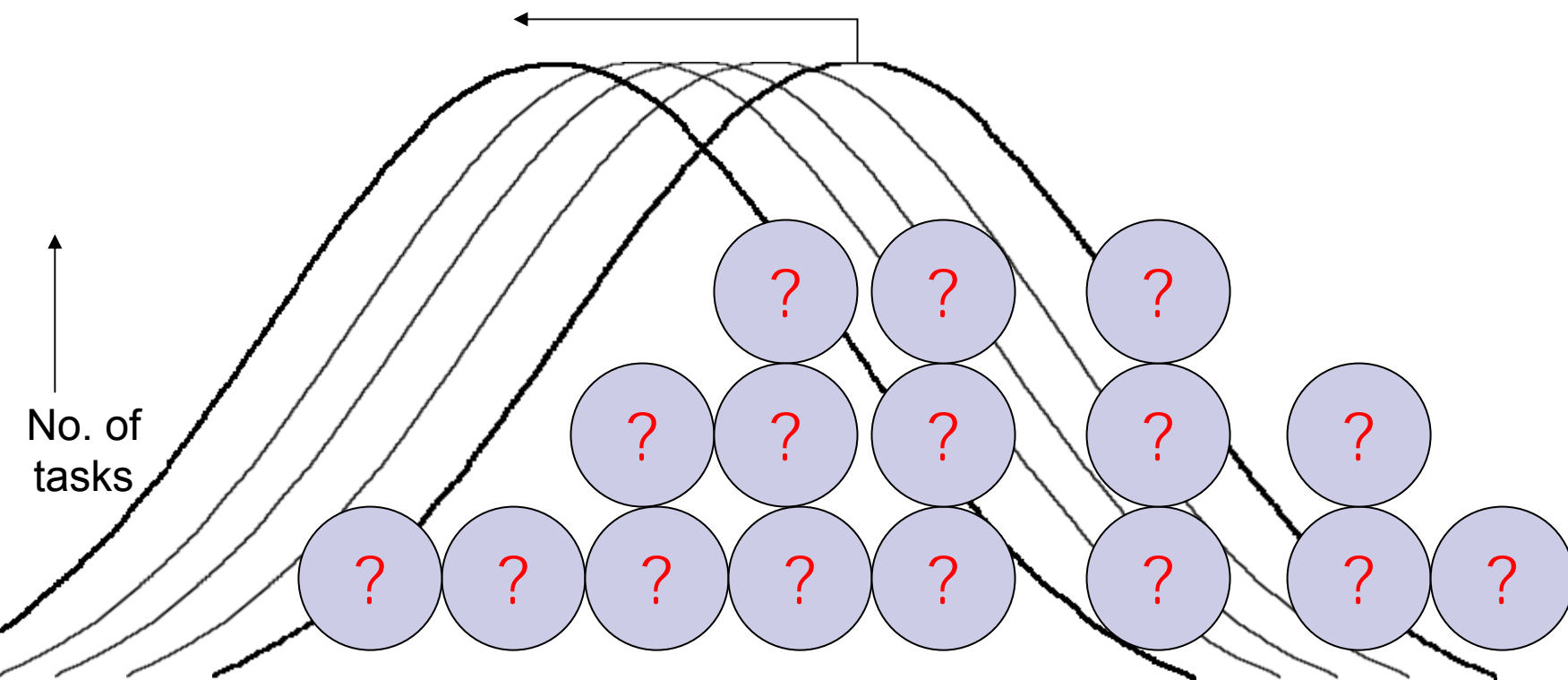
# Distribution of Cognitive Hurdles?

Some complexity unnecessary, but much inherent



# Distribution of Cognitive Hurdles?

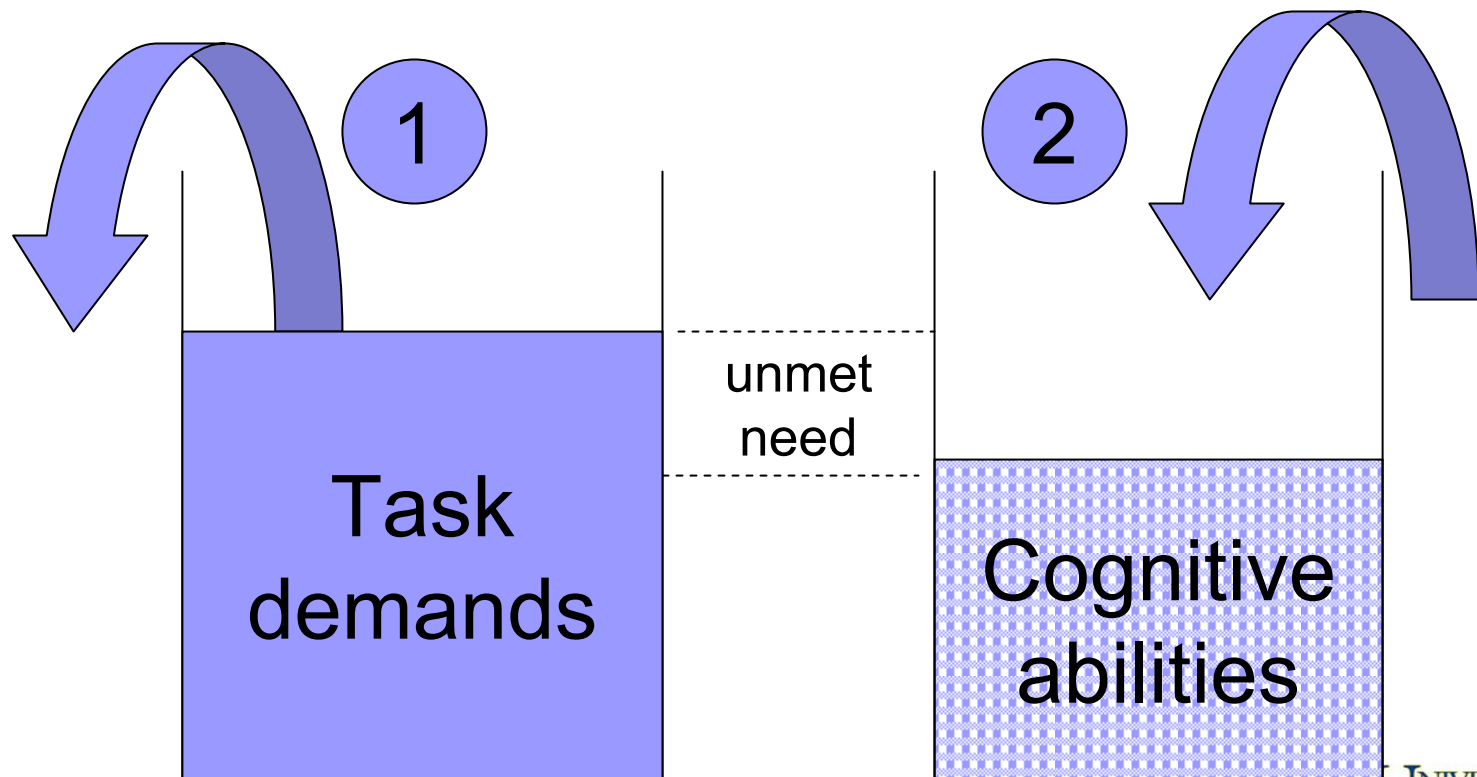
Aging lowers our ability to deal with it



Raw mental power (scores not age-normed)

# Can Minimize Cognitive Hurdles

1. Reduce task complexity, where possible
2. Provide cognitive assistance



# Why $g$ ? $g$ Theory Gives Good Guidance

## Strong evidence base, clockwork patterns

- What to do
  - How to audit task complexities in self-care
  - How to audit total job complexity (e.g., diabetes self-management)
  - How to audit patient populations' cognitive needs
  - How to quickly estimate individual patient's cognitive needs and supports
  - How to fashion instruction more sensitive to patient's cognitive needs
  
- What to expect
  - Which self-care tasks will have highest error rates (non-adherence)
  - How changes in task complexity will change adherence rates
  - Size of age & race disparities to expect on different health tasks
  - How disparities will increase or decrease with as treatment complexity rises or falls

- New tools for providers—all providers
- More feasible than eradicating social inequality
- More humane than denying ability differences

# Thank you.

Linda S. Gottfredson

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